The plan for Census 2000 will:

- **reduce processing costs by automating and contracting out where possible;**
- **improve accuracy of data by using administrative records;**
- **increase response time by using newer technologies such as the Internet;**
- **permit greater access to information by using the American FactFinder System;**
- **reduce risks through single point of failure by defining systems as client-server;**
- **improve response to public questions by implementing Decennial Management Controls;**
- **improve our ability to detect errors and variations in the census process by closely monitoring the systems;**
- **increase reliability by using standard products;**
- **improve security by implementing the Decennial Applicant Name Check; and**
- **provide more flexibility by using standards, allowing systems to be used and reused as required.**

The Decennial program area is divided into six major operational functions:

Data Collection

Data Collection supports all field data collection activities for Census 2000. Our overall objective during Census 2000 is obtaining a completed questionnaire from every housing unit. After we collect the forms, we will send them to the Data Capture Centers for processing.

Data Capture

The Census 2000 data capture methodology will use imaging technology designed to accommodate respondent-friendly forms. When we finish capturing the images and converting them into an ASCII data format we will electronically transmit the data to the processing site.

Data Processing

The Census 2000 data processing system will be a complex network of operational controls and processing routines supporting Decennial management control and data requirements. After processing the Census 2000 data, we will electronically transmit them to the Data Access and Dissemination System, where we will distribute them through the American FactFinder.

Accuracy and Coverage Evaluation

The objective of the Accuracy and Coverage Evaluation Survey is to produce a more accurate count by identifying people missed as well as people who were counted in the wrong place or counted more than once during the initial enumeration.

Telephone Questionnaire Assistance

The Telephone Questionnaire Assistance system will assist respondents in completing their Census 2000 questionnaires, accept respondent data from callers, or accept caller address information so we can send them a Census 2000 form.

Administrative Systems

We have instituted several management systems to provide a more effective and efficient environment for implementing Census 2000.

The Decennial program area provides a variety of services, all of which are directed toward collecting, preparing, and releasing Decennial Census information. The following table lists the major IT systems used to support Decennial program area services:

IT-Supported Decennial Program Area Services	
1998 U.S. Census Bureau Dress Rehearsal	Accuracy and Coverage Evaluation
Administrative Records	American FactFinder
Apportionment	Automated General and Industry & Occupation Coding and Resolution System
Automated Geographic Coding And Resolution System	Beta Site
Census Address Listing Data Capture Operations	Census Address Listing Field Support
Census Modeling and Budget Support	Census Archive System
Count Complaints and Resolution Control System	Data Capture System 2000
Decennial Applicant Name Check	Decennial Field Interface
Decennial Field Telecommunications	Decennial Local Area Network Support
Decennial Management Control	Decennial Responses via the Internet
Decennial Statistical Studies Division Analysis and Accuracy and Coverage Evaluation Support System	Evaluation/Experimental/Research Support System
Form Design, Printing, Inventory, and Distribution Control (Including The Census Form)	Governmental Unit Contact Support System
Management Information System	Mapping
Pre-Appointment Management System/Automated Decennial Administrative Management System	Procedure Development and Documentation System
Puerto Rico, Virgin Islands, and Pacific Areas Census Support and Processing Systems	Redistricting
Special Place and Group Quarters Data System	Telephone Questionnaire Assistance and 800 Service
Topologically Integrated Geographic Encoding and Referencing System /Master Address File	

Customers

The Decennial program area provides its products and services to customers inside and outside the U.S. Census Bureau, as shown in the following table:

Decennial Program Area Customers	
Internal	External
U.S. Census Bureau Headquarters	the President of the United States
Data Capture Centers	State and local governments
Regional Census Offices	Tribal governments
Census Field Offices	United States Postal Service
Local Collection Offices	Commercial firms
Area Office (Puerto Rico only)	Universities
Data Access and Dissemination System (DADS)	Private citizens
Other U.S. Census Bureau directorates	

Telephone Questionnaire Assistance

Telephone Questionnaire Assistance provides nationwide toll-free service to answer respondent questions or even, if the caller desires, to interview the caller over the phone, relieving them from filling out a form.

Beta Site

The Beta Site simulates the Census 2000 processing environment contained in the Regional Census Centers and Local Census Offices and provides a national support office for all Census 2000 automation activities. The Beta Site is an independent environment allowing us to test and assure the quality, completeness, and security of software, hardware, and network systems before we release them for Census 2000 production operations. The Beta Site is also the central point for resolving problems related to national Decennial Census systems and operations.

Data Access and Dissemination System (DADS)

DADS will electronically release and publish Census 2000 data via the Internet. DADS will be interactive, allowing users inside and outside the U.S. Census Bureau to access and extract data and information, in pre-tabulated form or as customized tabulations done on demand.

Accuracy and Coverage Evaluation

Given Census 2000's scope (over 118 million households), it is inevitable that a small percentage will be missed during the initial count. Accuracy and Coverage Evaluation identifies how many households were missed and where they are to help us correct the difference between our initial count and the actual population total.

Pre-Appointment Management System/Automated Decennial Administrative Management System (PAMS/ADAMS)

PAMS/ADAMS is the Census 2000 recruiting, personnel, and payroll system. It is an administrative management system that processes and tracks applications, records selections, reports on recruiting efforts, processes personnel and payroll, and archives historical data.

Printing

Questionnaire printing covers all advance letters, questionnaires, and reminder postcards, including labeling and shipping to the United States Postal Service or temporary U.S. Census Bureau field offices. In areas with mostly city-style addresses, the Postal Service will deliver the questionnaires; in areas with other types of addresses or delivery service, temporary census field staff will deliver the questionnaires. We will also print other types of forms, such as Privacy Act Notices, Pre-Notice Letters, and Reminder Cards.

The figure on the following page depicts the Census 2000 architecture.

Supporting a "Digital" Department of Commerce

The following are just a few examples of how the Decennial program area will use "digital" technology during Census 2000:

Computer-Assisted Interviewing processes: these include Computer-Assisted Personal Interviewing (CAPI), Computer-Assisted Telephone Interviewing (CATI), and Accuracy and Coverage Evaluation. We are enhancing CAPI and CATI data collection tools, allowing the public to reply more easily to Census 2000. Accuracy and Coverage Evaluation is a census quality check: after completing the Census 2000 Non-Response Follow-Up operations, we will conduct a nationwide sample of representative housing units. We designed the Accuracy and Coverage Evaluation to identify people and housing units missed during the initial enumeration. Accuracy and Coverage Evaluation will also identify people counted in the wrong place or those counted more than once.

Data Capture System (DCS) 2000: data capture is taking (by automatic or manual means) respondent information from completed census forms. We convert respondent answers and other control information on the census form to an electronic format suitable for computer processing. Data capture for Census 2000 will use the latest and best technology as well as allowing for more respondent-friendly questionnaires.

Decennial Application Name Check (DANC): this system is designed to ensure that all temporary U.S. Census Bureau employee applicants are properly screened. DANC sends names to the FBI to ensure that those people conducting Census 2000 and handling sensitive census data meet U.S. Census Bureau security requirements. DANC will help field staffs identify eligible applicants and hire them as quickly as possible.

Internet Questionnaire Assistance System: this Internet-based system helps the public complete their Census 2000 forms. Special Internet sites will help people locate and obtain information about how to answer their questionnaires.

Internet Questionnaire Collection System: this system helps collect Census 2000 questionnaire information via the Internet. The system will collect English-only short form information from households receiving a paper form. We will implement special redundancy, security, and performance requirements to ensure service availability. We will use special encryption and security methods to protect confidential information at all times. We will also implement a separate, built-in help system for both general and specific assistance.

Operations Control System (OCS) 2000: we are developing this system expressly to control field collection. OCS 2000 will capture and provide up-to-date data needed to effectively manage the Regional Census Centers, Census Field Offices, and Local Census Offices.

Pre-Appointment Management System/ Automated Decennial Administrative Management System (PAMS/ADAMS): PAMS/ADAMS is the Census 2000 recruiting, personnel, and payroll system. It is an administrative management system that processes and tracks applications, records selections, reports on recruiting efforts, processes personnel and payroll, and archives historical data.

- **Update/Leave: While canvassing an area to update the address file, field enumerators deliver addressed census questionnaires to each housing unit. We use this method in areas where there is no United States Postal Service delivery; and**
- **List/Enumerate: In very remote or sparsely-populated areas, enumerators visit each housing unit to either pick up or complete unaddressed short-form questionnaires that the Postal Service delivered previously.**

In addition, the U.S. Census Bureau is implementing a comprehensive set of procedures to count people who do not live in traditional housing units. These include people who live in nursing homes, college dormitories, and prisons; homeless people; and people who live at migrant and seasonal farm worker camps.

For any census tract where the initial response rate is less than 100 percent, enumerators will perform Non-response Follow-Up (that is, contact the respondent and complete a census questionnaire).

Decennial Field Interface

The Decennial Field Interface is the framework for all field collection control systems used at the Regional Census Centers, Census Field Offices, and for Early and Local Census Offices Field Operations. Our overall goal for this interface is to quickly provide the necessary data for effectively managing the field operations.

The Decennial Field Interface consists of eight principal components:

- **Operations Control System 2000;**
- **Office Support Systems;**
- **Pre-Appointment Management System/ Automated Decennial Administrative Management System, covered in detail under Administrative Systems;**
- **Geography Systems, covered in detail under the Geography section of this Operational IT Plan;**
- **Management Information System, covered in detail under Administrative Systems;**
- **Accuracy and Coverage Evaluation Control, covered under Accuracy and Coverage Evaluation;**
- **Administrative Control Systems; and**
- **Staff Authorization.**

All of the Decennial Field Interface components or subsystems are government-developed using the following commercial off-the-shelf software:

Decennial Field Interface Subsystem	Commercial off-the-shelf Software
Operations Control System 2000	UNIX, Oracle, Powerbuilder, C
Office Support Systems	Windows 95, cc:Mail, WordPerfect, Excel
Pre-Appointment Management System/Automated Decennial Administrative Management System	UNIX, Oracle, People Soft, COBOL, DATACAP Taskmaster (includes imaging, OMR and OCR)
Geography Systems	GUSX, MIMprint
Management Information Systems	SAS
Accuracy and Coverage Evaluation Control	CASE Management, UNIX, Oracle, Powerbuilder, C
Administrative Control Systems	Oracle, dBASE
Staff Authorization	Quattro Pro Spreadsheet

providing reports and data outputs, and maintaining historical data. PAMS/ADAMS will support the personnel and payroll processing and information needs of management and operational personnel at all offices, including Headquarters, the Regional Offices, the Regional Census Centers, the Census Field Offices, and the Local Census Offices. PAMS/ADAMS will decrease the time lag between the end of the payroll period and disbursing the paychecks.

PAMS/ADAMS supports two major functions:

Hiring of employees: Early Field Operations in each Regional Census Center require 2000 field employees for the urban operations and between 2000 to 2500 field employees in the rural Census Field Office Operations. To maintain this level of employment, we will have to have 30,000 to 40,000 job applicants in the PAMS/ADAMS system in each Regional Census Center. Our goal is to have a three-day turnaround from the testing of an applicant to the job offer.

Receipt/capture processing of personnel and payroll documents: We will process personnel/payroll documents in the Regional Census Centers. We will primarily use an image capture/Optical Character Recognition subsystem to scan and capture the data from the payroll and personnel documents. The Census Field Offices will ship applications and payroll forms to the Regional Census Centers via overnight mail delivery.

Peak staffing will require two shifts of 20 administrative employees to centrally process the payroll for the Census Field Offices.

We have sized PAMS/ADAMS to accommodate, at peak employment levels, approximately 325 thousand employees in 12 regions, working from as many as 520 Local Census Offices. Overall, we estimate that the U.S. Census Bureau will employ up to 500 thousand employees between January 1997 and October 2001. Furthermore, we estimate that there may be as many as eight applications accepted for every person hired (i.e., 4 million applications). PAMS/ADAMS can accommodate this workload, as well as the more than 30 million time and expense forms that will be submitted.

The Decennial Applicant Name Check (DANC) system is related to, but not a component of, PAMS/ADAMS. DANC is designed to ensure that all temporary U.S. Census Bureau employee applicants are properly screened. The FBI name check ensures that those people conducting Census 2000 and handling sensitive census data meet U.S. Census Bureau security requirements.

DANC will help field staffs to identify eligible applicants and hire them as quickly as possible. Applicants may dispute unfavorable name check results by either providing fingerprints or a deposition. DANC is designed to handle all applicants for Census 2000 positions, up to 100 thousand applications per day during the peak hiring period.

We are developing DANC in-house and will operate it using equipment that supports other Census 2000 systems.

Our planned approach for the DANC workflow is depicted in Figure 2, on the following page:

The configuration depicted in Figure 3, below, will fully support both Early Census and Census Field Operations through 2001. Within each Regional Census Center, three high-end UNIX servers will store and process data for most of the Decennial Field Interface subsystems. Users will access these servers over an 802.3 10BaseT Local Area Network (see below) using PC-based desktop computers. Each Regional Census Center will also contain digitizing workstations, imaging workstations, electrostatic plotters and networked printers. We will connect the Regional Census Centers to the U.S. Census Bureau's enterprise network through T1 or T3 Frame Relay links.

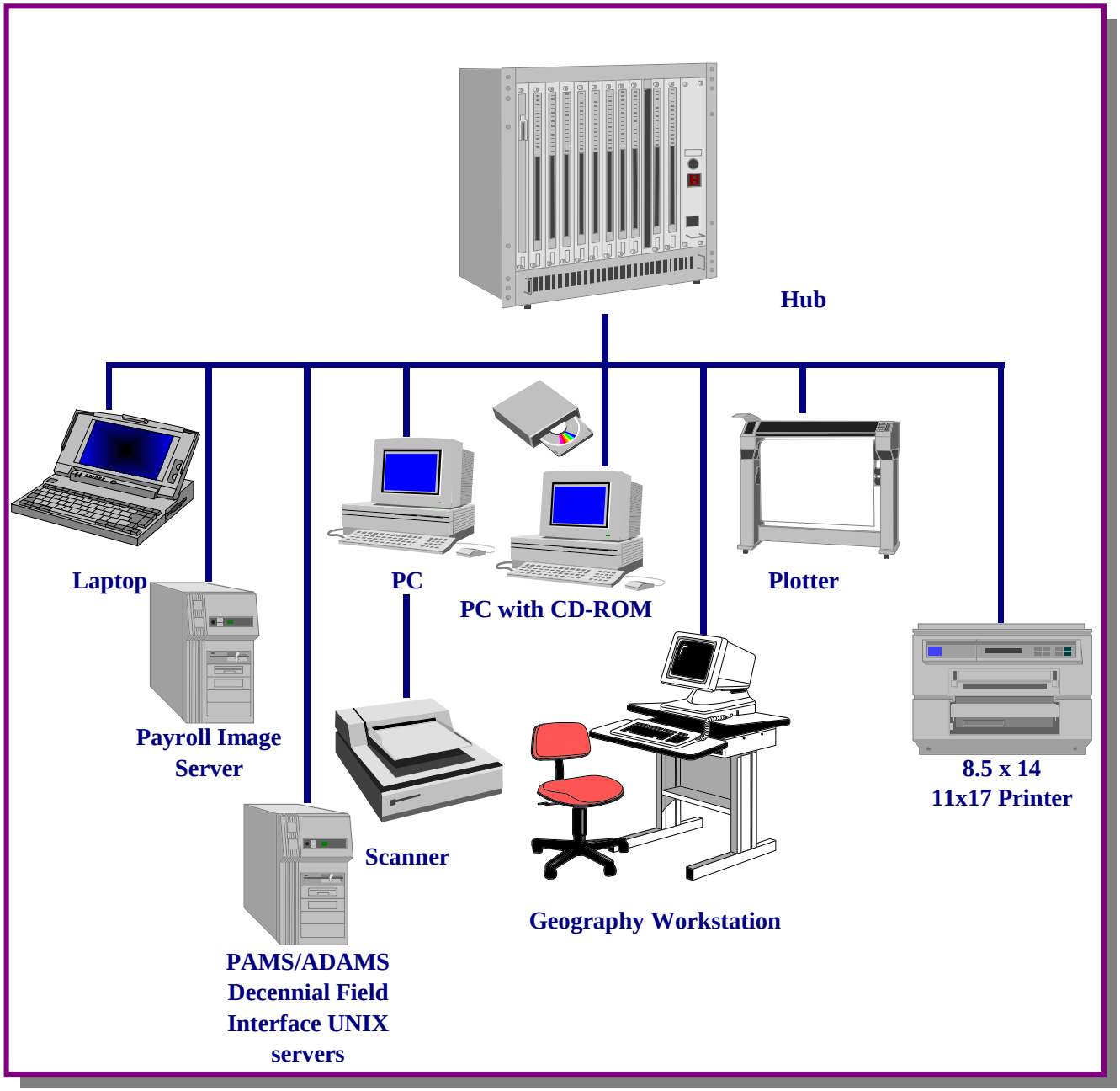

Figure 3: Regional Census Centers Configuration

Outreach Support System

In the 1999 Operational IT Plan, we discussed the Outreach Support System; in the last year, we have replaced this with the Targeted Data Base.

2.1.2 Data Collection Progress Against Planned Milestones

Data Collection Milestones, FY 98

Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
Conduct Non-response Follow-up and quality assurance Dress Rehearsal	05/98	06/98		06/98	Completed.
Conduct Non-response Follow-up and quality assurance Dress Rehearsal (South Carolina)	05/98	07/98		07/98	Completed (100% follow up required more time in the Field).

Data Collection Milestones, FY 99

Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
Conduct Address Listing (Census 2000)	08/98	02/99	07/98	02/99	Completed.
Conduct Canvassing (Census 2000)	01/99	05/99		05/99	Completed.
Update Master Address File with new Delivery Sequence File (pre-Census)	05/99	06/99		06/99	Completed.
Decennial Field Interface requirements for Census Operations (Census 2000)	09/98	06/99		06/99	Completed.
Update Decennial Field Interface requirements for Census Operations	12/98	06/99	09/98	06/99	Completed.
Operation Control System 2000 Requirements Census Operations (Census 2000)	09/98	06/99		06/99	Completed.
Install hardware, software, telecommunications in Regional Census Centers	03/99	09/99			In progress.

2.1.3 Data Collection Performance Measures

The Decennial program area has developed performance measures for activities that complete Census 2000. We are continuing our analysis to determine the targets for performance; status will not be available until after the census is completed. The following table lists the measures we have set based on various Census 2000 activity requirements.

Performance Goals	Performance Measures	Target Performance
Data Collection (Local Census Office contract)	Percent of server capacity used	To be determined following Evaluation & Verification (EV&V) Report
	Data line transmission response times	To be determined following EV&V Report
	Printer performance	To be determined following EV&V Report

2.1.4 Data Collection Risks

Adequate funding to support Census 2000 is a major risk. Major cutbacks have already kept us from completing some projects as originally planned.

Hiring Census 2000 support personnel is another area of high risk. The computer industry is currently experiencing an unprecedented shortage of technical people. This has driven the cost of technical staff beyond the reach of the government pay scale.

Rising equipment costs is another area of risk. From the planning stage to the actual implementation, equipment costs can escalate.

Poor paper and printing quality as well as bad forms design are also major risks. Any or all of these factors could hinder or even cripple the data collection process, as the equipment simply would not function properly. In addition, due to the enormous size of the Census 2000 data collection operation, any problem encountered would be magnified proportionately.

To reduce risks, we will use the Beta Site to test and assure the quality, completeness, and security of all data collection systems prior to production or operational site deployment. We will perform initial site acceptance tests at the Beta Site for all data collection systems before we ship them to the field offices. To further reduce risk, the Automation Infrastructure for Temporary Offices will use commercial off-the-shelf software and services readily available in the private sector. In addition, the 1998 Dress Rehearsal tested the major components of the data collection systems we will implement at Headquarters and the National Processing Center. Lastly, the U.S. Census Bureau has developed risk mitigation and contingency plans for data collection.

DCS 2000 operates by image scanning a form and then passing that image through Optical Mark Recognition (OMR) and Optical Character Recognition (OCR) engines. These engines will convert the images to a computer-readable data format. If the form cannot be successfully image scanned or electronically read (due to poor paper quality, for example), a human operator will manually key in the information. All DCS 2000 output will be electronic and will provide check-in and intermediate status data in addition to the ASCII census data captured from the forms. With adjustments for a traditional census, we anticipate capturing data from 143 million forms over 115 days.

Receiving and image scanning forms is our first data capture priority because we need to provide Headquarters with daily check-in data as part of ensuring Census 2000 is accurate and on schedule. Our second priority is extracting data from the forms and converting it to ASCII; we do this with clusters, autonomous image processing units based around the capacity of three scanners, and can do this in a more steady-state environment so long as we meet our first priority deadlines. We will provide each Data Capture Center with as many clusters as necessary to process the assigned workload. Figure 5, on the next page, depicts the DCS 2000 system configuration.

The table below lists the major DCS 2000 system components that will run on Windows NT, using commercial off-the-shelf software. This table also displays the estimated number of required components. Currently, these numbers are estimates; we won't have a final total until we determine the traditional census workload and schedule.

DCS 2000 Components

DCS 2000 Component	National Total (range)	Commercial off-the-shelf Software
Sorters	28-30	None
Scanners	150-162	KOFAX, Kodak Image Link
Key stations	1000-1500	Formware
Other workstations (e.g., system administration and check-out)	200-300	Staffware Workflow Management, TIVOLI
Recognition servers	450-500	FAQSS (for Optical Mark Recognition), CGK RecoStar (for Optical Character Recognition)
Other servers	300-400	Staffware Workflow Management, Oracle, TIVOLI
Backup storage automated tape libraries	7	Legato

The following site-level functions relate to check-in processing, interfaces, and systems administration for a Data Capture Center:

- **Check-In, which sorts incoming mail from the United States Postal Service;**
- **Systems Administration, which handles site workflow and systems administration;**
- **External Interface, which links DCS 2000 with other U.S. Census Bureau systems; and**
- **Check-Out, which verifies that Headquarters has received data for already-processed forms.**

The following data capture functions are handled by clusters:

- **Imaging, which scans documents and checks for image quality;**
- **Optical recognition, which reads information from images output and ASCII data;**
- **Key from Image, which repairs data that recognition engines could not interpret with a sufficient level of confidence;**
- **Audit Resolution, which checks for missing persons and data on the forms; and**
- **Cluster Workflow.**

Data Capture Milestones, FY 00					
Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
Prepare/Issue specifications for Check-in files	01/99	11/99	2/99		In progress.
Conduct mail-out form data capture (Census 2000)	03/00	05/00			
Conduct mail-out form Check-in (Census 2000)	03/00	05/00			
Conduct Be Counted Check-in (Census 2000)	04/00	05/00			
Conduct Be Counted data capture (Census 2000)	04/00	05/00			
Conduct replacement/late form data capture	04/00	05/00			
Conduct replacement/late – Late Form Check-in (census 2000)	04/00	06/00			
Conduct Non-Response Follow-up check-in (Census 2000)	05/00	07/00			
Conduct Non-Response Follow-up return data capture (Census 2000)	05/00	07/00			

Data Capture Milestones, FY 01					
Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
De-install production Systems 2000	09/00	12/00			
Start closing Data Capture Centers in Baltimore, Pomona, Phoenix	10/00	12/00			
De-install Data Capture Center systems at National Processing Center	11/00	12/00			

Data Capture Milestones, FY 02-03					
Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
No milestones to report					

KODAK (the scanner supplier), the Rochester Institute of Technology, (our research and development partner) and representatives from the U.S. Census Bureau and the Government Printing Office to discuss paper, printing, and other imaging issues.

Developed appropriate quality control measures. We worked closely with the Rochester Institute of Technology and the Government Printing Office to develop quality control procedures for printers. We put these procedures in place and applied them to all pre-production print runs. This lets us determine the quality of the paper and printing very early in the printing process.

Set up a program of paper sample testing. We have asked the Rochester Institute of Technology to test print samples for:

- **paper handling characteristics and the ability to feed the paper to the scanning system;**
- **proper color/ink drop out of the scanned images;**
- **physical dimensions to ensure they are within specifications;**
- **color and ink values to ensure they are within specifications; and**
- **bar code quality to ensure they are within specifications.**

By checking forms prior to production runs, we are mitigating the risk that printed forms will not conform to specifications.

Developed tests for out of specification forms. We are working with the Rochester Institute of Technology to develop forms that do **not** conform to specifications so we can test their effect on DCS 2000.

The fact that some Census 2000 requirements are still not finalized is another risk. Requirements that have not been finalized include, for example, complete traditional census plans. We continue to make assumptions and will proceed with development; however, if assumptions, projections, and decisions differ greatly, there will be detrimental effects on system development, production, deployment, and costs.

Having insufficient time to incorporate lessons learned from Dress Rehearsal is another risk. We are scheduling software releases to be inserted into DCS 2000 as we open each Data Capture Center. Each software release will include additional functionality based on the lessons learned during the previous Data Capture Center's site Systems Acceptance Test and Operational Test Dry Run. At present, we have defined all new functionality and scheduled all the software releases. However, if more requirements are added or current requirements are changed (see previous risk), there is a risk that we will not have sufficient time to incorporate all changes based on lessons from the Systems Acceptance Tests and Operational Test Dry Runs in addition to the new/changed requirements.

DCS 2000's proper sizing is another risk. The only true test to see if DCS 2000 can handle the millions of Census 2000 forms is Census 2000 itself. We are, therefore, relying heavily on modeling and small-scale load testing to mitigate the risk. We have run two load tests (in addition to Dress Rehearsal) and adjusted system sizing based on test results. We plan to perform comprehensive testing at system acceptance, requirements verification, and site acceptance testing to validate our modeling and previous load testing.

The last risk is that we might not finish developing, integrating, and testing the software and system before Census 2000

2.3.1 Data Processing

One of the primary objectives for Census 2000 is developing and implementing an effective and efficient automated data processing operation. We are undertaking a number of coordinated activities to meet this objective. We have divided the major Census 2000 data processing activities into three non-overlapping phases, described below. We will conduct these activities at Headquarters and at the National Processing Center in Jeffersonville, Indiana.

Pre-Census Activities

Pre-Census activities convert the Master Address File into a Census 2000 control database that remains linked to both TIGER and the Master Address File. These activities include long or short form sampling, targeting identifications (i.e., which households we will use for capturing surnames or include in the Accuracy and Coverage Evaluation survey), and preparing the address files for printing questionnaires. We provide the geographic and address-related control information to guide canvassing and address capture processing.

Census Activities

Census activities occur hand-in-hand with data collection and data capture. These activities control and coordinate data capture check-in as well as the Data Capture Centers storing census questionnaire data. Storing involves loading, formatting, and updating the central databases with the Census 2000 responses. We use these databases to compile the Decennial Response File, a collection of all Census 2000 submissions, whether by mail, U.S. Census Bureau enumerator, telephone interview, etc.

Post-Census Activities

Post-Census activities prepare original response data for release. These activities include selecting final household data from multiple responses, editing and imputation, coding write-in response data, estimating, recoding tabulation, and avoiding data disclosure. In addition, we create detailed data files from the information captured from long-form questionnaires. This includes editing responses, applying statistical techniques to account for missing data, and applying weights to these sample records. We then send these detailed data files to the Data Access and Dissemination System for distribution.

We established two centralized sites to manage and control all Census 2000 data processing. These centralized sites are located at the National Processing Center and at Headquarters, with each site having its own separate, distinct functions. The National Processing Center will perform all address list capture and clerical coding activities; Headquarters will initiate the remaining management and control activities from its Bowie Computer Center. The following table lists the processing sites and their related functions.

Centralized Management and Control Activities	
National Processing Center	**Bowie Computer Center at Headquarters**
Address List Capture Operations (Pre-Census Activity)	**Decennial Management Controls (Pre-Census and Census Activities)**
Computer-Assisted Coding of Questionnaires (Post-Census Activity)	**Post-Response Processing Systems (Post-Census Activity)**

clerical review and final coding resolution. We must finish this operation by the first quarter of 2001. The configuration will be comprised of two clustered UNIX servers each with 20 processors and 40 gigabytes of memory and 51 gigabytes of RAID (level 5) disk. The memory is used to support a very large memory (VLM) configuration to store the Oracle database.

Industry & Occupation (I&O) Coding: this involves coding the write-in responses to selected questions on the census long form. This is a complex process that requires coding of multiple response items that are dependent on each other. We will send the ASCII data string to Headquarters for automated coding. The Industry & Occupation Coding data that are not assigned codes at Headquarters are sent to National Processing Center. Those records will be matched against National Processing Center's dictionaries for clerical review and coding resolution. Note that we do not need those data for the apportionment counts and can complete them after December 2000. For the Industry & Occupation Coding Operation, we will re-use IT resources used in earlier operations.

Headquarters Data Processing Applications

Headquarters, from our Bowie Computer Center, will support Decennial Census data processing through 2001, using two VAX Alphaserver 4100s with one GB memory, as well as 950 GB RAID storage. In addition, we will use the following software:

- **Borland Delphi;**
- **C;**
- **C++;**
- **Digital Open VMS operating system;**
- **Fortran;**
- **SAS languages; and**
- **Turbo Pascal.**

Our programming staff will also use approximately 40 additional contract programmers through 2000.

The data processing activities performed at the Bowie Computer Center are as described below.

Decennial Management Controls

The Decennial Management Controls application is a complex network of operational controls providing the necessary interactions with the Master Address File, the field data collection sites, Data Capture Centers, Telephone Questionnaire Assistance centers, and multiple divisions. We have divided the activities that Decennial Management Controls oversees into two areas: Pre-Census System Development (i.e., address list building operations) and Census System Development (i.e., data collection operations).

Pre-Census System Development Activities:

The Decennial Master Address File: this is the foundation of the Decennial Master Address Listing Control System. We use it to control and track census operations.

The Decennial Field Interface: this is the framework for data collection control activities at the field offices. The Decennial Management Controls infrastructure provides files to the Decennial Field Interface

2.3.2 Data Processing Progress Against Planned Milestones

Data Processing Milestones, FY 98					
Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
Implement 100% Automated General Coding System (Dress Rehearsal – Sacramento and Menominee)	05/98	07/98	06/98	07/98	Completed.
Conduct Expert 100% General Coding (Sacramento and Menominee)	06/98	07/98		07/98	Completed.
Implement 100% Automated General Coding System (Dress Rehearsal – South Carolina)	05/98	08/98	06/98	07/98	Completed.
Conduct Expert 100% Automated General Coding (Dress Rehearsal – South Carolina)	06/98	08/98		07/98	Completed.
Implement Sample Automated General Coding System (Dress Rehearsal – South Carolina)	08/98	12/98	06/98	07/98	Completed.
Conduct Expert Sample General Coding	08/98	12/98	06/98	07/98	Completed.
Update Decennial Response File (Sacramento and Menominee)	04/98	07/98		07/98	Completed.
Update Decennial Response File (South Carolina)	04/98	08/98		08/98	Completed.
Purchase commercial off-the-shelf software for Auto Coding Industry & Occupation	07/98	08/98	08/98	09/98	Completed.

Data Processing Milestones, FY 99					
Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
Implement 100% Edit & Imput programs (Census Edited File for 100% data) (Dress Rehearsal – Sacramento and Menominee)	08/98	09/98	09/98	10/98	Completed.
Implement 100% Edit & Impute programs (Census Edited File for 100% data) (South Carolina)	08/98	09/98	09/98	10/98	Completed.
Deliver Final Census Edited File for 100% data to DADS (Dress Rehearsal)	09/98	09/98	10/98	10/98	Completed.
Test/Release Industry & Occupation coding system (Dress Rehearsal)	08/98	09/98	09/98	11/98	Completed.
Implement automated Place of Birth geocoding (Dress Rehearsal)	09/98	09/98	11/98	11/98	Completed.
Test/Release Residual Industry & Occupation Coding System	09/98	11/98		11/98	Completed.
Implement automated Place of Work geocoding (Dress Rehearsal)	09/98	09/98	11/98	11/98	Completed.
Implement merge of Place of Birth Coding results (Dress Rehearsal)	12/98	01/99	01/99	02/99	Completed.
Implement merge of Migration Coding Results (Dress Rehearsal)	12/98	01/99	01/99	02/99	Completed.

Data Processing Milestones, FY 00

Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
Create Place of Birth Coding Extract file	05/00	07/00			
Update Decennial Master Address File with Master Address File	06/00	07/00			
Update Data Response File	03/00	08/00			
Finish census Data Capture Processing	08/00	08/00			
Conduct Expert 100% General Coding	05/00	09/00			

Data Processing Milestones, FY 01

Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
Provide Master Address File collection to tabulation conversion file	09/00	10/00			
Implement 100% Edit & Imputation programs	09/00	11/00			
Provide tab – Geographic Reference File	10/00	11/00			
Deliver Final Census Edited File for 100% data to DADS	10/00	11/00			
Implement Sample Automated General Coding	08/00	12/00			
Conduct Expert Sample General coding system	08/00	12/00			
Deliver counts to President	12/00	12/00			
Implement clerical Place of Birth geocoding	06/00	01/01			
Implement clerical Migration geocoding	06/00	01/01			
Implement automated coding I & O	08/00	03/01			
Implement clerical coding I & O	09/00	03/01			
Implement Sample edit & Imputation	01/01	05/01			
Implement Sample Edit & Imputation (Census Edited File for sample data)	01/01	05/01			
Deliver Census Edited File for sample data to DADS	05/01	06/01			
Implement sample disclosure avoidance (Sample Edited Data File) (Census 2000)	06/01	08/01			

Data Processing Milestones, FY 02-03

Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
No milestones to report					

2.3.5 Data Processing References

Data Processing at Headquarters and the National Processing Center is supported by the following planning documents:

- **Budget Submission for 2001, dated June 1999;**
- ***Updated Summary: Census 2000 Operational Plan*, dated February 23, 1999;**
- **1999 Strategic IT Plan, dated December 18, 1998, pages 61-62, 93;**
- ***Contractor System Integration Support*, Requirement Initiative DC02-9701, approved May 9, 1997; and**
- ***System Definition and Requirements*, Requirement Initiative SM01-9502, approved September 20, 1996.**

2.4.1 Accuracy and Coverage Evaluation

After completing the Decennial Non-Response Follow-up operations, we will conduct a follow-up survey for a representative sample of housing units across the nation. This operation, the Accuracy and Coverage Evaluation, will identify people missed as well as people who were counted in the wrong place or counted more than once during the initial census enumeration.

Our results will not adjust apportionment counts, as was the intention of the 1998 Dress Rehearsal Integrated Coverage Measurement. The purpose of Accuracy and Coverage Evaluation is to produce a more accurate count than would otherwise be the case. The adjusted count will be used for constructing new schools, for social service programs, etc.

We have divided this evaluation into three operational areas: data collection, data capture, and data processing; we have described these in detail below. The Accuracy and Coverage Evaluation survey is a refinement of the Integrated Coverage Measurement Survey conducted during the 1998 Dress Rehearsal and discussed in depth in the 1999 Operational IT Plan.

Accuracy and Coverage Evaluation Data Collection

The Accuracy and Coverage Evaluation data collection is independent of all other data collection operations in Census 2000. Its field collection control component is part of the Decennial Field Interface data collection infrastructure. This field collection control component houses a series of Computer-Assisted Personal Interviewing control operations patterned after current survey operations. The control operations are:

- **Sample Control;**
- **Assignment Preparation/Tracking;**
- **Work Unit Check-in;**
- **Supervisory Review;**
- **Management Reports; and**
- **Close-out.**

We have divided Accuracy and Coverage Evaluation data collection into the following two phases.

Housing Unit Phase: during this phase, we take a list of housing units and match it to a census inventory of housing units. After reconciling the differences, we compile a new list of housing units confirmed to have

2.4.2 Accuracy and Coverage Evaluation Progress Against Planned Milestones

Accuracy and Coverage Evaluation Milestones, FY 98					
Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
No milestones to report					

Accuracy and Coverage Evaluation Milestones, FY 99					
Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
Develop Geographic Reference File specification	03/99	04/99		04/99	Completed.
Install Headquarters Accuracy and Coverage Evaluation hardware, systems software, telecommunications	07/99	07/99			
Install Regional Offices Accuracy and Coverage Evaluation hardware, systems software, telecommunications	07/99	07/99			
Review sample selection	06/99	09/99			In progress.

Accuracy and Coverage Evaluation Milestones, FY 00					
Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
Regional Offices receive laptop computers	03/00	03/00			
Deliver personal interviewing data files to Headquarters	05/00	05/00			

Accuracy and Coverage Evaluation Milestones, FY 01					
Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
Create redistricting estimates	03/01	03/01			

Accuracy and Coverage Evaluation Milestones, FY 02-03					
Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
No milestones to report					

2.4.5 Accuracy and Coverage Evaluation References

Accuracy and Coverage Evaluation is supported by the following planning documents:

- **Budget Submission for 2001, dated June 1999;**
- ***Updated Summary: Census 2000 Operational Plan*, dated February 23, 1999;**
- **1999 Strategic IT Plan, dated December 18, 1998, pages 61-62, 93;**
- ***Contractor System Integration Support*, Requirement Initiative DC02-9701, approved May 9, 1997; and**
- ***System Definition and Requirements*, Requirement Initiative SM01-9502, approved September 20, 1996.**

2.5.1 Telephone Questionnaire Assistance

Telephone Questionnaire Assistance provides the public with convenient telephone access to general Census 2000 information to help them complete their census forms or order replacement forms. Telephone Questionnaire Assistance will accommodate calls in English, Spanish, Chinese, Korean, Vietnamese, and Tagalog. Furthermore, this operation will have a well-publicized, national, toll-free number and will be configured to concurrently service a large number of calls.

The Coverage Edit Follow-Up Operation will use telephone centers to call households from whom we need additional response information.

Our overall plan for this telephone operation is acquiring and implementing a fully integrated nationwide network of call centers capable of supporting high-volume, limited duration, inbound calls from the general public as well as outbound follow-up calls to residential telephone numbers.

The Telephone Questionnaire Assistance operation will:

- **develop and implement a system design;**
- **combine computer-aided and live-operator services, including support in English, Spanish, Chinese, Korean, Vietnamese, and Tagalog;**
- **efficiently route calls (we are establishing a seamless network for the call centers);**
- **accurately respond with information to callers;**
- **capture the types of calls received;**
- **capture respondent data;**
- **prepare data files and reports, and perform data storage and transmission;**
- **report management information system results on a real-time basis; and**
- **establish a centralized referral system to answer questions.**

We estimate that we will receive 9 to 11 million calls during Census 2000, with approximately 80 percent of those calls occurring between April 3 and April 8, 2000. The table on the following page presents our best estimate of the number of inbound calls by type and average duration of each call:

Telephone Questionnaire Assistance Milestones, FY 99

Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
Award Telephone Questionnaire Assistance contract	10/98	01/99	12/98	12/98	Completed.
Telephone Questionnaire Assistance Operator/Computer-Assisted Telephone Interviewing instrument specifications	08/98	01/99		01/99	Completed.
Receive final Telephone Questionnaire Assistance/Reverse Computer-Assisted Telephone Interviewing/Coverage Edit Follow-Up system plans	02/99	03/99		03/99	Completed.

Telephone Questionnaire Assistance Milestones, FY 00

Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
Develop Coverage Edit Computer-Assisted Telephone Interviewing system	06/99	01/00			In progress.
Conduct Final Systems Integration Test	01/00	01/00			
Conduct Telephone Questionnaire Assistance (Census 2000)	03/00	07/00			
Conduct Telephone Interviews (reverse Computer-Assisted Telephone Interviewing) (Coverage Edit Follow-Up)	04/00	06/00			
Transmit Computer-Assisted Telephone Interviewing data to Headquarters (Coverage Edit Follow-Up)	04/00	06/00			

Telephone Questionnaire Assistance Milestones, FY 01-03

Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
No milestones to report					

2.6.1 Administrative Activities

The U.S. Census Bureau has instituted several management initiatives to more effectively and efficiently plan and implement Census 2000. Those initiatives include the:

- **Census 2000 Management Information System (MIS); and**
- **the Beta Site.**

Census 2000 Management Information System

The Census 2000 Management Information System is the official source for all Census 2000 information. Among the critical areas covered under this system's information umbrella are scheduling, work-in-progress, financial, and performance anomalies. In addition, the Management Information System will support cost modeling and other decision support software such as PERT, Critical Path Analysis, and What-If Analysis.

The Census 2000 Management Information System is a loosely coupled system consisting of a Primavera Project Planner program and an information delivery system, thus providing an enterprise-wide information system to access the data warehouse. Data warehousing is a strategy and method that physically and logically separates the operational data from the decision support database that is derived from operational data. Data in a data warehouse overlaps with operational data to allow users to perform "what if" analyses and to view summary level data rather than go into an operational production system to run queries. The data warehouse, a two-tiered client-server architecture, will use SAS Information Delivery System software products, including the following:

- **SAS/AF;**
- **SAS/EIS;**
- **SAS/ASSIST;**
- **SAS/GRAPH:**
- **SAS/CONNECT; and**
- **SAS/BASE.**

In addition, the clients have the Primavera Project Planner product installed on their desktops for reading the Master Activity Schedule. This Master Activity Schedule database resides on an enterprise Local Area Network file server.

The Census 2000 Management Information System's data warehouse will be updated daily with summary information from the transnational systems located in the field (Regional Census Centers and Data Capture Centers) and Headquarters. The transnational systems that feed the cost and progress data to the warehouse include the following:

- **Master Activity Schedule;**
- **Operation Control System 2000;**
- **Pre-appointment Management System/ Automated Decennial Administrative Management System;**
- **Telephone Questionnaire Assistance;**
- **Decennial Master Address File;**
- **Address Listing Capture Operations;**
- **Accuracy and Coverage Evaluation 2000;**
- **Cost Model;**
- **Commerce Administrative Management System;**
- **Headquarters Processing System; and**
- **Data Capture Centers' Management Information System.**

Every night, we will, with minimal effect on the transnational systems, make summary-level extracts from the feeder systems. As

Beta Site

While not a separate system, the Beta Site is a major component and is critical to the success of Census 2000. The Beta Site is an independent operation to test and assure the quality, completeness, and security of software, hardware, and network systems before we release them for production. The Beta Site is the central point for national Decennial Census problem resolution support for systems and operations conducted in the Data Capture Centers, the Regional Census Centers, the Regional Offices, the Local Census Offices, the National Processing Center, and Headquarters. The three major functions performed at the Beta Site are:

- **beta testing of software and systems;**
- **integrating components and systems; and**
- **nationally supporting decentralized systems.**

The Beta Site will have a hardware and software configuration that duplicates and accurately represents the current operating environments at the Data Capture Centers, the Regional Census Centers, the Regional Offices, the Local Census Offices, the National Processing Center, and Headquarters. The Beta Site's responsibilities include:

- **providing software testing for security compliance;**
- **providing a facility to test software releases on computer systems that are identical to production systems;**
- **ensuring that new releases of software properly interface with related software applications;**
- **providing testing for the automated release, acceptance and installation for all software releases;**
- **maintaining complete version control of all deployed software (application and system); and**
- **providing real-time system monitoring.**

The Beta Site serves as the center for integrating the Regional Census Centers. The Integration Center provides the following services:

- **receives Regional Census Center equipment;**
- **stages equipment;**
- **installs operating systems, third party software, and application software;**
- **burns-in components;**
- **stages software for shipment, and prepares installation tapes; and**
- **ships equipment and software to the Regional Census Centers.**

We will establish a National Support Center at the Beta Site. Its functions will include the following:

- **providing a customer hot-line service supporting various decentralized operating units;**
- **logging and resolving reported problems;**
- **controlling the release of new software to various decentralized census operating units;**
- **serving as a clearinghouse for hardware, software, clerical, personnel/payroll, and Management Information System problems; and**
- **providing real-time performance monitoring of decentralized systems.**

The Data Capture Centers, Regional Census Centers, Regional Offices, Local Census Offices, National Processing Center, and Headquarters will each provide the Beta Site with hardware and software systems representing their respective operating environments. Therefore, the architecture and the cost of the components are fully represented in the other Decennial program area sections (Data Processing, Data Capture, etc.) of this

2.6.3 Administrative Activities Performance Measures

Since the Beta Site will simulate the operating environments at the Data Capture Centers, Regional Census Centers, Regional Offices, Local Census Offices, National Processing Center, and Headquarters, the performance measures described in the preceding paragraphs (2.1.4, 2.2.4, etc.) also apply to the Beta Site.

The Decennial program area has developed performance measures for activities that complete Census 2000. We are continuing our analysis to determine the targets for performance; status will not be available until after the census is completed. The following table lists the measures we have set based on various Census 2000 activity requirements.

Administrative Activities Performance Measures

Performance Goals	Performance Measures	Target Performance
Administrative Activities: Management Information System	To be determined; dependent on feeder systems	
Administrative Activities: Beta Site	Percent of server capacity used	To be determined following Evaluation & Verification (EV&V) Report
	Data line transmission response times	To be determined following EV&V Report
	Printer performance	To be determined following EV&V Report
	Timeliness of deliverables	To be determined from Master Activity Schedule
	Trouble Report resolution	To be determined based on Remedy logs

2.6.4 Administrative Activities Risks

Adequate funding to support Census 2000 is a major risk. Major cutbacks have already kept us from completing some projects as originally planned.

Hiring Census 2000 support personnel is another area of high risk. The computer industry is currently experiencing an unprecedented shortage of technical people. This has driven the cost of technical staff beyond the reach of the government pay scale.

Rising equipment costs is another area of risk. From the planning stage to the actual implementation, equipment costs can escalate.

The major purpose of the Beta Site is to reduce the risk of system failure. The Beta Site will simulate the Census 2000 processing environment and provide a National Support Center for all Regional Census Centers, Local Census Offices, and Data Capture Centers. System developers and program managers will use the integrating, testing, and support services of the Beta Site to successfully install systems at the field sites.

3.2 Decennial Program Area Infrastructure Progress Against Planned Milestones

Decennial Program Area Infrastructure Milestones, FY 98-03					
Description	Estimated		Actual		Progress to Date
	Start Date	Finish Date	Start Date	Finish Date	
No milestones to report					

3.3 Decennial Program Area Infrastructure Performance Measures

The Decennial program area infrastructure does not have any performance measures to report.

3.4 Decennial Program Area Infrastructure Risks

The Decennial program area infrastructure does not have any risks to report.

3.5 Decennial Program Area Infrastructure References

The Decennial program area infrastructure is supported by the following planning documents:

- ***Enterprise Printer Resources,*** **Requirement Initiative PRMAP9701, approved May 13, 1998; and**
- ***Enterprise Personal Computer Management and Acquisition Plan,*** **Requirement Initiative PCMAP9601, approved December 5, 1995.**